

REMARKS

This is in response to the Office Action mailed on March 22, 2006 in which claims 1, 2, 4, 7, 8, 10-12, 15, and 16 were rejected, and claims 3, 5, 6, 9, and 14 were withdrawn from consideration. With this Amendment, claims 1, 2, and 15 have been amended and claim 14 has been canceled. Claims 1-12 and 15-16 are pending in this application and are presented for reconsideration and allowance.

Claim Objections

Correction of claim 2 was requested. With this amendment, the phrase “hard mask” was replaced with “hard mask layer” to distinguish this layer from the hard mask of claim 1.

Claim Rejections - 35 U.S.C. § 112

Claim 2 was rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Office Action suggests that claim 2 conflicts with claim 1, because it is not possible for a portion of the sensor to be removed if the entire top surface of the sensor is covered with a hard mask.

With this Amendment, claim 2 has been amended to clarify that the hard mask of claim 1 is formed from a hard mask layer of claim 2. The phrase “hard mask layer” is now present to distinguish the layer from the completed “hard mask” such that the meaning of the claims is now clear and definite. Therefore, the rejection of claim 2 under 35 U.S.C. § 112 should be withdrawn.

Claim Rejections - 35 U.S.C. § 102

In the Office Action, claims 1, 2, 4, 7, 8, 15, and 16 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Lin et al. patent (U.S. Patent No. 6,262,869). Independent claims 1 and 15 have been amended to clarify that removing a portion of the sensor (claim 1) or reader (claim 15) not covered by the hard mask defines the stripe height of the sensor or reader.

In discussing Lin, the Office Action suggests that layer 312 is a “hard mask”. In fact, layer 312 is not a hard mask, but rather the cap layer of the GMR sensor. At col. 10, lines 32-34 Lin states: “a nonmagnetic cap layer 312, which may be 5 nm of tantalum (Ta), may be

provided on the pinning layer 308 for its protection.” Cap layers are well known components of GMR sensors.

Lin acknowledges that layer 312 is a part of the spin valve or GMR sensor, not mask. At col. 12, lines 23-27, Lin states:

In FIG. 9G spin valve sensor layers 310, 304, 302, 302, 306, 308 and 312 are sputter-deposited over the entire wafer in the presence of a magnetic field (40 Oe) that is directed longitudinal to the ABS so that the sense layer 304 has an easy axis that is oriented in the same direction.

Thus, layer 312 (the cap layer) is specifically referred to as one of the spin valve sensor layers, not a mask.

It is also significant that all of the spin valve sensor layers, including cap layer 312, are sputter-deposited **over the entire wafer**. Thus, layer 312 does not define the stripe height of the sensor. As further described in col. 12, patterned bilayer photoresist 360 is used to define the track width of the sensor. The definition of stripe height is then performed as described at col. 12, lines 55-60:

A third set of processes for patterning a sensor stripe height (distance between the ABS and recessed edge of the spin valve sensor) continues. After ion milling (not shown) to define the sensor stripe height and bilayer photoresist removal (not shown) in the spin valve sensor 300 has been completed, as shown in FIGS. 19M and 19N.

Lin thus indicates that bilayer photoresist is used to define the sensor stripe height, and then the bilayer photoresist is removed. This is the conventional technique used in the prior art, and creates the problems which are overcome with the present invention. In claim 1, the hard mask extends from the airbearing surface a distance substantially equal to the desired stripe height of the sensor. In contrast, nonmagnetic cap layer 312 of the GMR sensor in Lin covers the entire wafer (Lin, col. 12, lines 23-24). The stripe height is not defined by the cap layer 312; in fact, cap layer 312 along with the other spin valve sensor layers are partially removed using ion milling and bilayer photoresist to define the sensor stripe height.

Similarly, claim 15 requires removing a portion of the reader not covered by the hard mask to form a back edge of the reader that defines a stripe height of the reader. Lin does not perform this step. Cap layer 312 is not a hard mask but rather a part of the reader, and the stripe height is not defined by removing a portion of the reader that is not covered by cap layer 312. Rather, cap layer 312 and the other sensor layers 310, 304, 302, 306, and 308, are removed together by ion milling. The stripe height is defined by the use of bilayer photoresist as has been typical in the prior art.

The Lin patent does not teach or suggest the method of the present invention, as defined in either independent claim 1 or independent claim 15. The rejection of claims 1, 2, 4, 7, 8, 15, and 16 under 35 U.S.C. § 102(b) as being anticipated by Lin should be withdrawn.

Claims 15 and 16 were rejected under 35 U.S.C. § 102(e) as being anticipated by Chang et al. (U.S. Patent No. 6,434,814). The Office Action relies upon FIG. 18 as showing removal of a portion of a reader not covered by the hard mask to form a back edge. The Office Action suggests that edges 322 or 324 are the “back edge”. In fact, edges 322 and 324 are the side edges of the read sensor (Chang, col. 9, lines 25-26). The ion milling described in Chang at col. 9, lines 11-30 refers to removal of material on the sides of the sensor to define the read track width, not the stripe height. Claim 15, as amended, requires removing a portion of the reader not covered by the hard mask to form a back edge of the reader that defines a stripe height of the reader. This is neither taught nor suggested by Chang. The rejection under 35 U.S.C. § 102(e) based upon Chang should be withdrawn.

Claim Rejections - 35 U.S.C. § 103

In the Office Action, claims 10-12 were rejected under 35 U.S.C. § 103(a) as being obvious over the Lin et al. patent in view of the knowledge of one of ordinary skill in the art. Claims 10-12 depend from allowable independent claim 1 and are therefore also allowable.

CONCLUSION

With this Amendment, independent claims 1 and 15 are in condition for allowance. Dependent claims 2-12 and 16 depend from allowable independent claims 1 and 15, and therefore are also allowable. Claims 3, 5, 6, and 9, which were withdrawn from consideration, should be allowed along with the other dependent claims.

Respectfully submitted,

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